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Pesticide Fact Sheet Number 225: Zinc Borate

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16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, ~~on a specific pesticide or group of pesticides.~~ on zinc borate, a fungicide. A Fact Sheet is issued after one of ~~the~~ the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, science findings.

b. Identifiers/Open-Ended Terms

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EPA

Pesticide Fact Sheet

PB91-218024

Name of Chemical: Zinc Borate ($2ZnO.3B_2O_3.3.5H_2O$)
Reason for Issuance: New Chemical Registration
Date Issued: 7/15/91
Fact Sheet Number: 225

1. Description

Generic Names:	Zinc Borate ($2ZnO.3B_2O_3.3.5H_2O$)
Trade Name:	Firebrake® ZB
EPA Shaughnessy Code:	128859
Year of Initial Registration:	1991
Pesticide Type:	Fungicide
U. S. and Foreign Producers:	U. S. Borax & Chemical Corp. 3075 Wilshire Blvd. Los Angeles, CA 90010

2. Use Patterns and Formulations

Application sites: Interior uses, such as PVC carpet backing, shower curtains, wall coverings, etc., and exterior uses, such as PVC tenting and awnings, polyolefin wire and cable coverings, etc.

Type of formulation: 100% manufacturing grade formulation.

Types and methods of application: Granular product can be fed into an extruder, calender machine, or injection molding machine for plastics or incorporated during pigment dispersion cycle for coatings.

Application rates: The effective additive level varies depending on fungal susceptibility of the product and ultimate conditions for the use of the product. For protection of plastics, a rate range of 3-30 parts product per hundred parts resin is used. For coatings, rates range from 1.25 to 3.0 lb/gal.

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3. Science Findings

Summary Science Statement

The toxicological data submitted for this active ingredient included the full complement of acute studies. Results of these studies show that zinc borate is in the toxicity category III (CAUTION) based on acute dermal and primary eye irritation studies with rabbits.

Zinc borate did not induce either genotoxic effects or chromosomal aberrations in mutagenicity studies.

Environmental fate data were waived because there is no direct or indirect discharge resulting from production of this chemical.

Chemical Characteristics

Color:	White
Physical State:	Granular
Melting Point:	Greater than 550°C
Partical Size:	8-20 um (mean)
Density:	40 to 50 lbs/cu. ft. (bulk)
pH:	7.6 (In deionized H_2O)

Toxicological Characteristics

Acute effects:

1. Acute Oral (LD_{50}) in Rats - The LD_{50} in rats (males) was found to be greater than 10 g/kg. Zinc borate did not produce severe signs of toxicity in treated rats.

2. Acute Dermal Toxicity (LD_{50}) in Rabbits - The LD_{50} was estimated to be greater than 10 g/kg in both male and female albino rabbits.

3. Primary Eye Irritation in Albino Rabbits - Zinc borate was shown to be an eye irritant producing mild conjunctivitis in albino rabbits.

4. Primary Dermal Irritation/Corrosivity in Albino Rabbits - The Primary Irritation Index of zinc borate in rabbits was found to be 0. Therefore, it is not considered to be an irritant or corrosive.

Data from acute oral and acute dermal toxicity tests place the chemical in Toxicity Categories IV and III, respectively. These

results were duplicated in the primary eye and primary dermal irritation studies. Precautionary labeling language as follows is required for this product:

"Avoid skin and eye contact. Avoid inhalation. Wash after handling."

Mutagenic effects:

In the Salmonella/microsomal Assay (Ames Bioassay) for bacterial mutagenic activity, zinc borate did not elicit any mutagenic response in Salmonella tester strains when tested either with or without a metabolic activation system.

Environmental Fate

The Agency reviewed available data on fate and transport of zinc and boron in the environment and concluded that no additional data were warranted for the proposed pesticidal use. The following were among factors contributing to this position:

1. According to the registrant, there is no direct or indirect discharge of zinc borate into the environment from manufacturing this chemical.

2. The water solubility for zinc borate at 23°C (average temperature under natural conditions) is very low (0.1% at pH 5 and 7, and 0.03% at pH 9). The zinc borate will be incorporated into some synthetic matrix to act as an antifungal agent. To be effective over time, the chemical must not have a propensity to solubilize and leach out of the matrix. Any movement of the chemical out of the matrix will either be by abrasion (wear) or leaching as solubilized ions. Therefore it is highly unlikely that large amounts of the chemical will get into the the environment through its pesticidal use. Leaching studies are being required to confirm that ion levels in the leachate would be of no toxicological concern.

3. When reformulated into other products where it serves as a fire retardant and fungicide , i.e. in PVC products, ceramics, other chemicals, cosmetics, etc., zinc borate becomes chemically incorporated into the finished products and loses its identity.

4. The chemical reactions of zinc borate can form a composite of oxides of zinc and boron. Both these chemicals occur naturally in soil and are essential micronutrients for plants. Moreover,

both zinc and boron are used extensively in agriculture as soil amendments to improve the vigor of plants. As soil amendments, these chemicals are applied at levels substantially higher than would be anticipated from their use in plastics as a fungicide. The Agency is unaware of any lasting adverse effects on the environment from the soil amendment uses of zinc and boron. The Agency concluded that additional data requirements would not add any substantive information to the available scientific data base.

Based on these facts, the registrant was granted a waiver from all environmental fate data requirements including hydrolysis data.

Ecological Characteristics

In avian dietary studies, the LC_{50} value of zinc borate in the mallard ducklings (Anas platyrhynchos) is estimated to be greater than 5,620 ppm. No mortality occurred in either the control or treated groups. A slight reduction in body weight was observed at the 6,520 ppm concentration during the exposure period. There was no effect on feed consumption at any concentration tested.

The acute toxicity of zinc borate to bluegill sunfish (Lepomis macrochirus) was tested under static conditions at mean concentrations of 94, 137, 182, 248, and 335 ppm. The 96-hr LC_{50} for bluegill sunfish was shown to be greater than 335 ppm. These results indicate that zinc borate is practically nontoxic to the fish species tested.

Benefits

Potential advantages to the general public appear to exist by having Firebrake ZB available as a fungicide in view of the following:

- Zinc borate has a relatively low toxicity with no demonstrated adverse public health effects following extensive long-term use as a fire retardant in applications including carpet backing, fabric coating, wall covering, urethane foam, roofing PVC tenting and awnings, etc.

- Zinc borate is a broad-spectrum fungicide with no demonstrated adverse environmental effects. This chemical would provide protection of a variety of plastic products and may decrease the environmental burden of more toxic pesticides by acting as an alternative for protection of plastics.

Tolerance Assessment

There are no proposed direct food or feed uses of zinc borate, therefore, EPA has not established tolerances or exemptions from tolerances in raw agricultural commodities or processed food and feed products under the Federal Food, Drug and Cosmetic Act (FFDCA).

Summary of Major Data Gaps

A dermal sensitization study is required for this chemical. The study is outstanding at this time. However, the registrant has agreed to conduct this study as a condition for registration. The results of the study must submitted to EPA within nine (9) months of issuance of conditional registration of this product. Additionally, a leachability study is being required as a condition of registration. This study must also be submitted within nine (9) months of registration approval.

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